

WithOnePlanet

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Carbon
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Question

Lesson 2

Teacher notes

It's a question of energy

Years

7 to 8

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INQuIRY     

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WithOnePlanet

Open education
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It's a question of energy

Lesson 2: Teacher notes

This document provides the teacher with the details of the lesson.

At a glance

To use the understandings, information and questions developed during the *Introduce* phase of the *INQuIRY* process to assist students in determining the essential questions that will form the basis of their investigation.

Students will:

- > distil the learning from the *Introduce* phase and consider the key questions that arise for them from this learning
- > develop one or more essential questions about carbon for use in the *Investigate* phase of the *INQuIRY* process.

Lesson focus

The focus of the *Question* phase is for students to develop an essential question or a small number of essential questions that accurately reflect their ideas and thoughts from the *Introduce* phase and can act as a springboard for their learning in the *Investigate* phase.

Key lesson objectives

Science

Students will be able to represent their current understanding as they:

- > develop essential question(s).

Literacy

Students will be able to:

- > reflect on their ideas from the *Introduce* phase
- > contribute to discussions about the key concepts and components of the essential question.

This lesson also provides opportunities to monitor the development of students' general capabilities.

Teacher background information

Essential questions

Wiggins and McTighe (1998); OCM BOCES (2013) outline the following core attributes of successful essential questions:

Core-Focused, INQuIRY-Based, Reinforce Thinking Skills, Interdisciplinary, and Engaging.

At Years 7 and 8, students may have already been introduced to the key characteristics of essential questions, but may not be entirely familiar or comfortable with it. Students will require guidance, in the form of scaffolding and modelling, to be able to construct their own essential question, either as a whole class, or in small groups. Use the *Essential Questions Guide* document (OCM BOCES 2013) and *It's a question of energy – Student worksheet* to assist students with their learning.

The development of the essential question(s) is a natural progression from the student-provided understandings, thoughts, observations and questions that have arisen in the *Introduce* phase of the *INQuIRY* process.

Through summarising and paraphrasing student contributions from the *Introduce* phase, as well as through the use of stimulating and clarifying questioning, the teacher can act as a facilitator in the development of the essential question.

The *WithOnePlanet Carbon: Science curriculum* is based on five essential questions that are considered at each stage in the students' schooling from F to 10. These are shown in the Table below. In addition, the specific *WithOnePlanet Big ideas* for Years 7 and 8 are also a key stimulus for the development of the essential question(s) at this stage in the *INQuIRY* process. These are shown in Table below.

Table: WithOnePlanet Big ideas for Years 7 to 8

Big Ideas	What is carbon?	What is the carbon cycle?	What is climate change and what role does carbon play in it?	What is my carbon footprint and how can I reduce it?	What can be done to mitigate climate change on a regional scale?
Years 7 to 8	The chemical bonds between carbon atoms in molecules such as carbon dioxide, crude oil and sugars can be broken to release energy.	Energy is transferred between different forms to generate electricity. The inefficiencies of energy transformations can result in the production of heat.	Some of the consequences of climate change are short term and some are long term. Some of the consequences of climate change are reversible and some are permanent.	I can reduce my carbon footprint by reducing my energy consumption from non-renewable resources.	Countries in the Asia-Pacific region have renewable and non-renewable resources and can make individual and collective decisions about their energy sources and use.

Sources:

Wiggins, G & McTighe, J 1998, *Understanding by design*, Association for Supervision & Curriculum Development, Alexandria, VA.

OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>.

These essential questions can provide a stimulus for, and form the basis of, the essential questions that students develop in the *Question* phase of the *INQUIRY* process. However, the questions that the students arrive at may not necessarily be exactly the same as these *WithOnePlanet Big ideas* essential questions. This is preferable as it is important that the questions are student-driven rather than provided by the teacher. Student ownership and engagement in the unit is important. However, it is also important that the teacher plays the role of effective facilitator and gently guides the students' thinking in an appropriate direction using the techniques outlined previously.

Some examples of possible student-derived essential questions include:

- > Why is carbon so important for life on Earth?
- > Is there a way to release the energy from carbon that does not produce greenhouse gas?
- > How can we reduce our dependency on carbon-based energy?
- > Why do we use so much energy and do we really need to?
- > How can we collaborate with neighbouring countries to reduce our global ecofootprints?

Equipment

For the Class

A summary of the students' ideas from the *Introduce* phase in Lesson 1.

Preparation

- > Read the Essential questions guide document. OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>
- > Review and summarise students' ideas from the *Introduce* phase, including responses to both the Generate-Sort-Connect-Elaborate and CSI activities
- > Using students' ideas and the *WithOnePlanet Big ideas* (see Table 1 above), generate some possible essential questions that can act as a teacher reference guide when facilitating student discussion of the essential question during the lesson.

Lesson steps

1. Students to review their own GENERATE – SORT – CONNECT – ELABORATE ideas and their ideas from the CSI activity from the *Introduce* phase
2. Provide the class with a brief summary of their ideas from these activities
3. Explain to students that, in order to investigate their ideas further, it is valuable to come to a consensus about key ideas, thoughts and questions that the students have so far.
4. Use the *Essential Questions Guide* to introduce to students the idea of essential questions - what they are, what role they play in learning and the key attributes that make a good essential question. Provide students with some examples of essential questions, as shown in the *Essential Questions Guide*
5. Introduce the *It's a question of energy – Student worksheet* to the students, and facilitate the development of an essential question - related to Lesson 1 and the *WithOnePlanet Big ideas* – with the class
6. From this essential question, students to form small groups of no more than three students. Students to brainstorm a list of the concepts and other questions that they feel they need to research and/or answer in order to answer the essential question
7. Each student group to provide feedback from their discussions. The teacher can generate a list of the key concepts and questions that students have generated. This will inform teacher planning of the *Investigate* phase of the *INQUIRY* process.